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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/657,854

Applicant(s)

MARTIN ET AL.

Examiner

Jeff Piziali

Art Unit

2629

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 33-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 33-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-946)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-7, 12, and 33-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 1 provides for the use of a processor (lines 2, 4, and 6), but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 1 (as well as dependent claims 2-7) is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

4. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a processor**" (claim 1, line 2); "**a processor**" (claim 1, line 4); and "**a processor**" (claim 1, line 6).

It would be unclear to one having ordinary skill in the art whether the above limitations are intended to be identical to, or distinct from, one another.

5. Claim 3 provides for the use of a processor (line 1), but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 3 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

6. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a processor**" (claim 1, line 2); "**a processor**" (claim 1, line 4); "**a processor**" (claim 1, line 6); and "**a processor**" (claim 3, line 2).

It would be unclear to one having ordinary skill in the art whether the above limitations are intended to be identical to, or distinct from, one another.

7. Claim 5 provides for the use of a processor (line 1), but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 5 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

8. Claim 5 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a processor**" (claim 1, line 2); "**a processor**" (claim 1, line 4); "**a processor**" (claim 1, line 6); and "**a processor**" (claim 5, line 2).

It would be unclear to one having ordinary skill in the art whether the above limitations are intended to be identical to, or distinct from, one another.

9. Claim 6 provides for the use of a processor (line 1), but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 6 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

10. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a processor**" (claim 1, line 2); "**a processor**" (claim 1, line 4); "**a processor**" (claim 1, line 6); and "**a processor**" (claim 6, line 2).

It would be unclear to one having ordinary skill in the art whether the above limitations are intended to be identical to, or distinct from, one another.

11. Claim 7 provides for the use of a processor (line 1), but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is

intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim 7 is rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

12. Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a processor**" (claim 1, line 2); "**a processor**" (claim 1, line 4); "**a processor**" (claim 1, line 6); and "**a processor**" (claim 7, line 2).

It would be unclear to one having ordinary skill in the art whether the above limitations are intended to be identical to, or distinct from, one another.

13. Claim 12 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a relative digital encoder**" (claim 12, line 2).

It would be unclear to one having ordinary skill in the art what the digital encoder is intended to be relative to.

14. Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01.

An omitted structural cooperative relationship results from the claimed subject matter: "**a non-transitory computer-readable medium on which is program code configured to processor to execute a method comprising**" (claim 33, lines 1-2).

It would be unclear to one having ordinary skill in the art what the above (nonsensical) limitation is intended to mean.

15. Claim 33 recites the limitation "**processor**" (line 2). There is insufficient antecedent basis for this limitation in the claim.

16. The remaining claims are rejected under 35 U.S.C. 112, second paragraph, as being dependent upon rejected base claims.

17. The claims are rejected under 35 U.S.C. 112, second paragraph, as being indefinite.

As a courtesy to the Applicant, the examiner has attempted to also make rejections over prior art -- based on the examiner's best guess interpretations of the invention that the Applicant is intending to claim.

However, the indefinite nature of the claimed subject matter naturally hinders the Office's ability to search and examine the application.

Any instantly distinguishing features and subject matter that the Applicant considers to be absent from the cited prior art is more than likely a result of the indefinite nature of the claims.

The Applicant is respectfully requested to correct the indefinite nature of the claims, which should going forward result in a more precise search and examination.

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claims 1-15 and 33-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Delson et al (US 6,002,184 A)** in view of the **Osborne et al (US 6,005,551 A)**, **Massie et al (US 5,625,576 A)**, and **Roston et al (US 5,754,023 A)**.

Regarding claim 1, **Delson** discloses a method comprising:

using a processor [e.g., Fig. 21: digital computer 2530] to receive a sensor signal comprising a raw sensor value [e.g., Fig. 21: x] from a sensor [e.g., Fig. 21: 2552],

the raw sensor value associated with a position [e.g., Fig. 21: actual output position x] of a manipulandum [e.g., Fig. 5A: 123] in a range of motion;

using a processor [e.g., Fig. 21: digital computer 2530] to calculate an adjusted sensor value [e.g., Fig. 21: δx] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

using a processor [e.g., Fig. 21: digital computer 2530] to output an output signal comprising the adjusted sensor value (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Should it be shown that **Delson** discloses calculating an adjusted sensor value, as instantly claimed, with insufficient specificity:

Osborne discloses a method comprising:

using a processor [e.g., Figs. 2, 3: MCU] to receive a sensor signal comprising a raw sensor value [e.g., Fig. 3: x-axis, y-axis, throttle position] from a sensor [e.g., Fig. 2: 37; Fig. 3: 40],

the raw sensor value associated with a position of a manipulandum [e.g., Fig. 1: 13] in a range of motion;

using a processor [e.g., Figs. 2, 3: MCU] to calculate an adjusted sensor value [e.g., Fig. 4: 108] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

using a processor [e.g., Figs. 2, 3: MCU] to output an output signal comprising the adjusted sensor value (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Delson and **Osborne** are analogous art, because they are from the shared inventive field of force feedback systems.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to combine **Osborne's** force effect rendering logic with **Delson's** control system, so as to reduce errors induced by noise while providing real-time rendering of effects.

Should it be shown that the combination of **Delson** and **Osborne** discloses a manipulandum, as instantly claimed, with insufficient specificity:

Massie discloses a method comprising:

using a processor [e.g., Fig. 5: 560, 562, 570, 580] to receive a sensor signal comprising a raw sensor value [e.g., Fig. 5: pulses] from a sensor [e.g., Fig. 5: 550],

the raw sensor value associated with a position of a manipulandum [e.g., Fig. 5: 512] in a range of motion;

using a processor [e.g., Fig. 5: 560, 562, 570, 580] to calculate an adjusted sensor value [e.g., Fig. 5: angles, representation of position, velocity, etc.] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

using a processor [e.g., Fig. 5: 560, 562, 570, 580] to output an output signal comprising the adjusted sensor value (see the entire document, including Column 20, Line 8 - Column 22, Line 63).

Delson, Osborne and **Massie** are analogous art, because they are from the shared inventive field of force feedback systems.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to combine **Massie's** linkage system with **Osborne's** and **Delson's** control system, so as to facilitate a high fidelity position and torque or force feedback while minimizing backlash.

Should it be shown that the combination of **Delson, Osborne** and **Massie** discloses an output signal, as instantly claimed, with insufficient specificity:

Roston discloses a method comprising:

using a processor [e.g., Fig. 18: computer] to receive a sensor signal comprising a raw sensor value [e.g., Fig. 5: $y(t)$] from a sensor [e.g., Fig. 4: sensors],

the raw sensor value associated with a position of a manipulandum [e.g., Fig. 24] in a range of motion;

using a processor [e.g., Fig. 18: computer] to calculate an adjusted sensor value [e.g., Fig. 5: $e(t)$, $u(t)$] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

using a processor [e.g., Fig. 18: computer] to output an output signal comprising the adjusted sensor value (see the entire document, including Column 4, Line 20 - Column 21, Line 55).

Delson, **Osborne**, **Massie** and **Roston** are analogous art, because they are from the shared inventive field of force feedback systems.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to combine **Roston's** compensation techniques with **Massie's**, **Osborne's** and **Delson's** control system, so as to stabilize the system while enhancing mobility.

Regarding claim 2, **Delson** discloses the compliance is associated with a compliance constant [e.g., Fig. 21: K] and a current output force [e.g., Fig. 21: X_{set}] (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Regarding claim 3, **Delson** discloses using a processor to determine a closed-loop position-dependent force based at least in part on the raw sensor value (see the entire document, including Fig. 21; Column 35, Line 35 - Column 36, Line 16).

Regarding claim 4, **Delson** discloses transmitting forces from an actuator [e.g., Fig. 21: 2524] to the manipulandum (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Massie also discloses transmitting forces from an actuator [e.g., Fig. 5: 540] to the manipulandum with a belt drive [e.g., Fig. 1: 126, 136] (see the entire document, including Column 8, Line 3 - Column 20, Line 7).

Regarding claim 5, **Delson** discloses using a processor to filter the raw sensor value for overshoot sensor values occurring at limits to the range of motion of the manipulandum (see the entire document, including Column 46, Lines 19-47).

Osborne also discloses using a processor to filter [e.g., Fig. 4: 108] the raw sensor value for overshoot sensor values occurring at limits to the range of motion of the manipulandum (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Regarding claim 6, **Delson** discloses using a processor to calibrate the range of motion of the manipulandum by adjusting minimum and maximum values of the range of motion based at least in part on an extent of motion of the manipulandum up to a designated time (see the entire document, including Column 46, Lines 19-47).

Osborne also discloses using a processor to calibrate the range of motion of the manipulandum by adjusting minimum and maximum values of the range of motion based at least in part on an extent of motion of the manipulandum up to a designated time [e.g., Fig. 4: 104] (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Regarding claim 7, **Delson** discloses using a processor to normalize the raw sensor value to a normalized range of motion, wherein the adjusted sensor value is further associated with the normalized raw sensor value (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Osborne also discloses using a processor to normalize [e.g., via Figs. 2, 3: MCU A/D conversion] the raw sensor value to a normalized range of motion, wherein the adjusted sensor value is further associated with the normalized raw sensor value (see the entire document, including Fig. 4; Column 4, Line 8 - Column 10, Line 61).

Regarding claim 8, this claim is rejected by the reasoning applied in rejecting claim 1; furthermore, **Delson** discloses a device comprising:

a manipulandum [e.g., Fig. 5A: 123];

a linkage mechanism [e.g., Fig. 5A: 110, 117] providing a degree of freedom to the manipulandum;

a sensor [e.g., Fig. 5A: 129; Fig. 21: 2552] operable to sense a position of the manipulandum in the degree of freedom and to output a raw sensor value representing the position [e.g., Fig. 21: actual output position x]; and

a processor [e.g., Fig. 21: digital computer 2530], operable to:
receive a sensor signal from the sensor, the sensor signal comprising the raw sensor value;

calculate an adjusted sensor value [e.g., Fig. 21: δx] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

output an output signal comprising the adjusted sensor value (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Osborne discloses a device comprising:

a manipulandum [e.g., Fig. 1: 13];

a linkage mechanism providing a degree of freedom to the manipulandum;

a sensor [e.g., Fig. 2: 37; Fig. 3: 40] operable to sense a position of the manipulandum in the degree of freedom and to output a raw sensor value representing the position [e.g., Fig. 3: x-axis, y-axis, throttle position]; and

a processor [e.g., Figs. 2, 3: MCU], operable to:
receive a sensor signal from the sensor, the sensor signal comprising the raw sensor value;

calculate an adjusted sensor value [e.g., Fig. 4: 108] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

output an output signal comprising the adjusted sensor value (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Massie discloses a device comprising:

a manipulandum [e.g., Fig. 2A: 202];

a linkage mechanism [e.g., Fig. 1] providing a degree of freedom to the manipulandum;

a sensor [e.g., Fig. 5: 550] operable to sense a position of the manipulandum in the degree of freedom and to output a raw sensor value representing the position [e.g., Fig. 5: pulses]; and

a processor [e.g., Fig. 5: 560, 562, 570, 580], operable to:

receive a sensor signal from the sensor, the sensor signal comprising the raw sensor value;

calculate an adjusted sensor value [e.g., Fig. 5: angles, representation of position, velocity, etc.] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

output an output signal comprising the adjusted sensor value (see the entire document, including Column 20, Line 8 - Column 22, Line 63).

Roston discloses a device comprising:

a manipulandum [e.g., Fig. 24];

a linkage mechanism [e.g., Fig. 2] providing a degree of freedom to the manipulandum;

a sensor [e.g., Fig. 4: sensors] operable to sense a position of the manipulandum in the degree of freedom and to output a raw sensor value representing the position [e.g., Fig. 5: $y(t)$];
and

a processor [e.g., Fig. 18: computer], operable to:
receive a sensor signal from the sensor, the sensor signal comprising the raw sensor value;
calculate an adjusted sensor value [e.g., Fig. 5: $e(t)$, $u(t)$] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and
output an output signal comprising the adjusted sensor value (see the entire document, including Column 4, Line 20 - Column 21, Line 55).

Regarding claim 9, **Delson** discloses the linkage mechanism includes a chain of four rotatably-coupled members [e.g., Fig. 5A: 105, 119, 121] coupled to ground [e.g., Fig. 5A: 102] at each end of the chain (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Regarding claim 10, **Delson** discloses an actuator [e.g., Fig. 21: 2524] coupled to the linkage mechanism, the actuator operative to output a force in the degree of freedom (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Regarding claim 11, **Delson** discloses a belt drive transmission [e.g., Fig. 5A: 101] coupled between the actuator and the linkage mechanism (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Massie also discloses a belt drive transmission [e.g., Fig. 1: 126, 136] coupled between the actuator and the linkage mechanism (see the entire document, including Column 8, Line 3 - Column 20, Line 7).

Regarding claim 12, **Delson** discloses the sensor comprises a relative digital encoder (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Osborne also discloses the sensor comprises a relative digital encoder [e.g., Figs. 2, 3: MCU A/D convertor] (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Regarding claim 13, **Delson** discloses the sensor is coupled to the actuator such that the sensor is operable to detect rotation of a shaft of the actuator (see the entire document, including Column 1, Lines 48-57).

Regarding claim 14, **Delson** discloses the processor is operable to calibrate a range of motion of the manipulandum by adjusting minimum and maximum values of the range of motion

based at least in part on an extent of motion of the manipulandum up to a designated time (see the entire document, including Column 46, Lines 19-47).

Osborne also discloses the processor is operable to calibrate a range of motion of the manipulandum by adjusting minimum and maximum values of the range of motion based at least in part on an extent of motion of the manipulandum up to a designated time [e.g., Fig. 4: 104] (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Regarding claim 15, **Delson** discloses the processor is operable to determine a closed-loop force based at least in part on the raw sensor value (see the entire document, including Fig. 21; Column 35, Line 35 - Column 36, Line 16).

Regarding claim 33, this claim is rejected by the reasoning applied in rejecting claims 1 and 8; furthermore, **Delson** discloses a non-transitory computer-readable medium on which is program code configured to processor [e.g., Fig. 21: digital computer 2530] to execute a method comprising:

receiving a sensor signal comprising a raw sensor value [e.g., Fig. 21: actual output position x] from a sensor [e.g., Fig. 5A: 129; Fig. 21: 2552],

the raw sensor value associated with a position of a manipulandum [e.g., Fig. 5A: 123] in a range of motion;

calculating an adjusted sensor value [e.g., Fig. 21: δx] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

outputting an output signal comprising the adjusted sensor value (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Osborne discloses a non-transitory computer-readable medium on which is program code configured to processor [e.g., Figs. 2, 3: MCU] to execute a method comprising:

receiving a sensor signal comprising a raw sensor value [e.g., Fig. 3: x-axis, y-axis, throttle position] from a sensor [e.g., Fig. 2: 37; Fig. 3: 40],

the raw sensor value associated with a position of a manipulandum [e.g., Fig. 1: 13] in a range of motion;

calculating an adjusted sensor value based at least in part on the raw sensor value [e.g., Fig. 4: 108] and a compliance between the sensor and the manipulandum; and

outputting an output signal comprising the adjusted sensor value (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Massie discloses a non-transitory computer-readable medium on which is program code configured to processor [e.g., Fig. 5: 560, 562, 570, 580] to execute a method comprising:

receiving a sensor signal comprising a raw sensor value [e.g., Fig. 5: pulses] from a sensor [e.g., Fig. 5: 550],

the raw sensor value associated with a position of a manipulandum [e.g., Fig. 2A: 202] in a range of motion;

calculating an adjusted sensor value [e.g., Fig. 5: angles, representation of position, velocity, etc.] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

outputting an output signal comprising the adjusted sensor value (see the entire document, including Column 20, Line 8 - Column 22, Line 63).

Roston discloses a non-transitory computer-readable medium on which is program code configured to processor [e.g., Fig. 18: computer] to execute a method comprising:

receiving a sensor signal comprising a raw sensor value [e.g., Fig. 5: $y(t)$] from a sensor [e.g., Fig. 4: sensors],

the raw sensor value associated with a position of a manipulandum [e.g., Fig. 24] in a range of motion;

calculating an adjusted sensor value [e.g., Fig. 5: $e(t)$, $u(t)$] based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum; and

outputting an output signal comprising the adjusted sensor value (see the entire document, including Column 4, Line 20 - Column 21, Line 55).

Regarding claim 34, **Delson** discloses the compliance is associated with a compliance constant [e.g., Fig. 21: K] and a current output force [e.g., Fig. 21: X_{set}] (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Regarding claim 35, **Delson** discloses determining a closed-loop position-dependent force based at least in part on the raw sensor value (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

Regarding claim 36, **Delson** discloses transmitting forces from an actuator to the manipulandum with a belt drive (see the entire document, including Fig. 21; Column 35, Line 35 - Column 36, Line 16).

Regarding claim 37, **Delson** discloses filtering the raw sensor value for overshoot sensor values occurring at limits to the range of motion of the manipulandum (see the entire document, including Column 46, Lines 19-47).

Osborne also discloses filtering [e.g., Fig. 4: 108] the raw sensor value for overshoot sensor values occurring at limits to the range of motion of the manipulandum (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Regarding claim 38, **Delson** discloses calibrating the range of motion of the manipulandum by adjusting minimum and maximum values of the range of motion based at least in part on a extent of motion of the manipulandum up to a designated time (see the entire document, including Column 46, Lines 19-47).

Osborne also discloses calibrating the range of motion of the manipulandum by adjusting minimum and maximum values of the range of motion based at least in part on a extent of motion of the manipulandum up to a designated time [e.g., Fig. 4: 104] (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

Response to Arguments

21. Applicant's arguments filed on 18 October 2010 have been fully considered but they are not persuasive.

The Applicant contends, "one of skill in the art would recognize a relative digital encoder to be a type of digital encoder that senses relative positions, etc. rather than absolute positions, etc" (see Page 8 of the Response filed on 18 October 2010). However, the examiner respectfully disagrees.

An omitted structural cooperative relationship results from the claimed subject matter: "**a relative digital encoder**" (claim 12, line 2). It would be unclear to one having ordinary skill in the art what the digital encoder is intended to be relative to. Relative to what?

The Applicant contends, "sensors provide inaccurate position sensing because of compliance that occurs naturally within the sensed system or within the sensors themselves. Compliance occurs in some instances because of poorly-fitted components or flex inherent within some transmission systems... The specification discloses adjusting the raw sensor signal to

compensate for the compliance. Such a compensation could be advantageously used in the Delson system to provide a more accurate sensor signal to compute δx , but δx itself is not an adjusted sensor signal. Delson does not disclose adjusting the signal from sensor 2552 at all" (see Pages 10-11 of the Response filed on 18 October 2010). However, the examiner respectfully disagrees.

The term, "compliance" simply means, "cooperation" (e.g., see Dictionary.com).

The Applicant admits the claimed, "compliance [i.e., cooperation] between the sensor and the manipulandum" occurs naturally and inherently in prior art systems including manipulandum position sensors.

The Applicant also concedes that **Delson's** "value δx is calculated based on the raw sensor signal" (Page 10 of the Response filed on 18 October 2010).

Any manipulandum position sensor value will necessarily be "based on" the compliance/cooperation between the sensor and the manipulandum. Moreover, any adjustments to such a manipulandum position sensor value will also intrinsically be "based on" the compliance/cooperation between the sensor and the manipulandum.

To make an analogy: suppose a "raw" temperature value is sensed (by a thermometer) based on the temperature outside. If this "raw" temperature value is then adjusted for wind chill,

the adjusted wind chill temperature is still necessarily and inherently "based on" the outside temperature.

Therefore, **Delson** discloses using a processor [e.g., Fig. 21: digital computer 2530] to calculate an adjusted sensor value [e.g., Fig. 21: δx] based at least in part on the raw sensor value [e.g., Fig. 21: x] and a compliance [aka "cooperation"] between the sensor [e.g., Fig. 21: 2552] and the manipulandum [e.g., Fig. 5A: 123] (see the entire document, including Column 35, Line 35 - Column 36, Line 16).

The Applicant contends, "The cited portion of Osborne does not discuss compliance between a sensor and a manipulandum" (see Page 12 of the Response filed on 18 October 2010). However, the examiner respectfully disagrees.

The claimed, "compliance [aka 'cooperation'] between the sensor and the manipulandum" occurs naturally and inherently in prior art systems including manipulandum position sensors.

Therefore, **Osborne** discloses using a processor [e.g., Figs. 2, 3: MCU] to calculate an adjusted sensor value [e.g., Fig. 4: 108] based at least in part on the raw sensor value [e.g., Fig. 3: x-axis, y-axis, throttle position] and a compliance [aka "cooperation"] between the sensor [e.g., Fig. 2: 37; Fig. 3: 40] and the manipulandum [e.g., Fig. 1: 13] (see the entire document, including Column 4, Line 8 - Column 10, Line 61).

The Applicant contends, "Figure 5 does not show or otherwise disclose adjusting a sensor value, nor does Figure 5 disclose or suggest 'an adjusted sensor value based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum' as recited in claim 1" (see Page 12 of the Response filed on 18 October 2010). However, the examiner respectfully disagrees.

Massie discloses using a processor [e.g., Fig. 5: 560, 562, 570, 580] to calculate an adjusted sensor value [e.g., Fig. 5: angles, representation of position, velocity, etc.] based at least in part on the raw sensor value [e.g., Fig. 5: pulses] and a compliance [aka "cooperation"] between the sensor [e.g., Fig. 5: 550] and the manipulandum [e.g., Fig. 5: 512] (see the entire document, including Column 20, Line 8 - Column 22, Line 63).

The Applicant contends, "The cited Figure in Roston, like the Figure cited in Delson, is a basic feedback control diagram. There is no indication that a sensor signal is adjusted at all, let alone 'based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum.' The $e(t)$ and $u(t)$ functions cited by the Examiner are not adjusted sensor signals and are not 'based at least in part on the raw sensor value and a compliance between the sensor and the manipulandum.'" (see Page 13 of the Response filed on 18 October 2010). However, the examiner respectfully disagrees.

Roston discloses using a processor [e.g., Fig. 18: computer] to calculate an adjusted sensor value [e.g., Fig. 5: $e(t)$, $u(t)$] based at least in part on the raw sensor value [e.g., Fig. 5: $y(t)$] and a compliance [aka "cooperation"] between the sensor [e.g., Fig. 4: sensors] and the manipulandum [e.g., Fig. 24] (see the entire document, including Column 4, Line 20 - Column 21, Line 55).

Applicant's arguments with respect to claims 1-7 and 33-38 have been considered but are moot in view of the new ground(s) of rejection.

By such reasoning, rejection of the claims is deemed necessary, proper, and thereby maintained at this time.

Conclusion

22. Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Piziali whose telephone number is (571) 272-7678. The examiner can normally be reached on Monday - Friday (6:30AM - 3PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chanh Nguyen can be reached on (571) 272-7772. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jeff Piziali/
Primary Examiner, Art Unit 2629
28 December 2010